AIR FORCE

QUALIFICATION TRAINING PACKAGE

(AFQTP)

for

STRUCTURAL

(3E3X1)

MODULE 18

MASONRY CONSTRUCTION AND MAINTENANCE

TABLE OF CONTENTS

MODULE 18

MASONRY CONSTRUCTION AND MAINTENANCE

AFQTP GUIDANCE

INTRODUCTION 18-3

AFQTP UNIT 1

MORTOR

MIX MORTAR(18.1.2.) 18-4

AFQTP UNIT 2

LAY MASONRY UNITS

BLOCK(18.2.2.) 18-9

REVIEW ANSWER KEY Key-1

Career Field Education and Training Plan (CFETP) references from 1 Apr 97 version.

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AIR FORCE QUALIFICATION TRAINING PACKAGES
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INTRODUCTION

Before starting this AFQTP, refer to and read the "Trainee/Trainer Guide" located on the AFCESA Web site **http://www.afcesa.af.mil/**

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. ***It is important for the trainer and trainee to understand*** that an AFQTP ***does not*** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:
AFQTP completion
Hands-on certification

Diamond task:
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location.*

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOT revised this AFQTP. If you have any recommendations for improving this document, please contact the Structures Career Field Manager at the address below.

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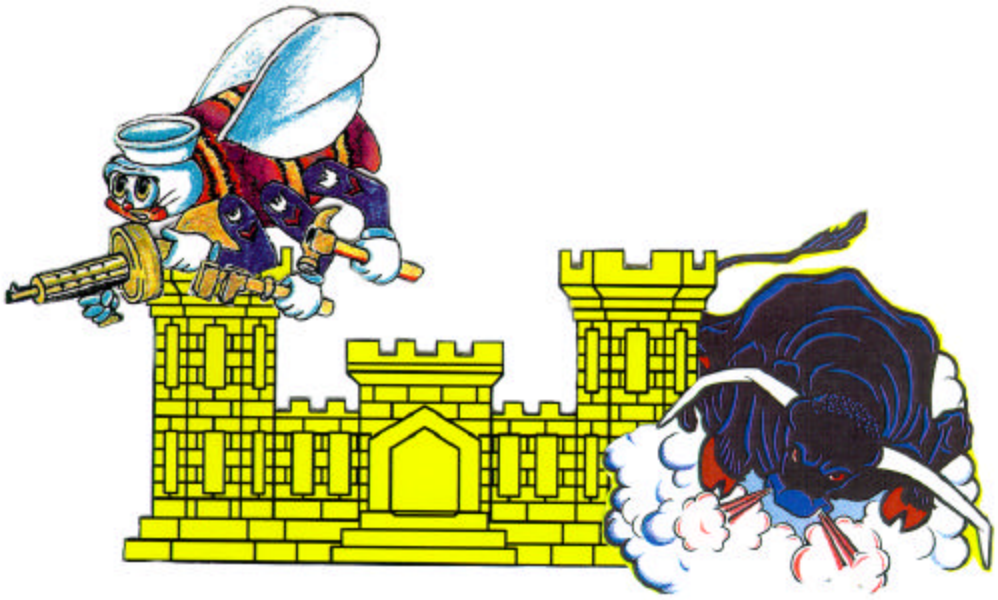
Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.



MORTAR

MODULE 18 **AFQTP UNIT 1**

MIX MORTAR (18.1.2.)

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MIX MORTAR

Task Training Guide

STS Reference Number/Title:	18.1.2. Mix Mortar
Training References:	• 3E351 CDCs • NAVEDTRA 12521 • MODERN MASONRY by Clois E. Kicklighter • MASONRY BLOCK EXPLAINED by Bergwall Productions Video Tape #2 Mortar: Mixing & Spreading
Prerequisites:	• Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	• Mortar hoe, Concrete mixer, Shovel
Learning Objective:	• Trainee should be able to mix mortar to an adequate consistency.
Samples of Behavior:	• Trainee will know the different types of mortar and how to mix them.
Notes:	

MIX MORTAR

Background: Mortar is the bonding agent that ties masonry units into a strong, well-knit, weather tight structure. It secures each of the units into a wall or other building element. Mortar is generally made up of cementious (cement-like) materials together with sand and water. There are 2 types of cement you will normally use for mortar: Portland and Masonry cement. Masonry cement already contains lime in the cement mix. When using Portland cement you must add lime to the cement mix. Masonry sand should be used for both mixes. This is very fine sand that has little or no rock in it.

Mixing Mortar. The following table describes different mixing amounts for different service conditions. This table is only a guide and should be used in conjunction with other training references.

TYPE OF SERVICE	CEMENT	HYDRATED LIME	MORTAR SAND
Ordinary	1 unit masonry cement or 1 unit portland cement	1/2 to 1-1/4 units	2-1/4 to 3 units or 4-1/2 to 6 units
Heavy loads, violent winds, or severe frost action.	1 unit masonry cement plus 1 unit portland cement or 1 unit portland cement	0 to 1/4 units	4-1/2 to 6 units or 2-1/4 to 3 units

The manner in which mortar is mixed has much to do with the final product. You should place all the dry materials into the mixer first, mixing them for about 2 minutes before adding water. When adding water, you should add it slowly to avoid splashing. Mixing time should be at least 3 minutes minimum, and the mortar should be mixed until a completely uniform mixture is obtained.

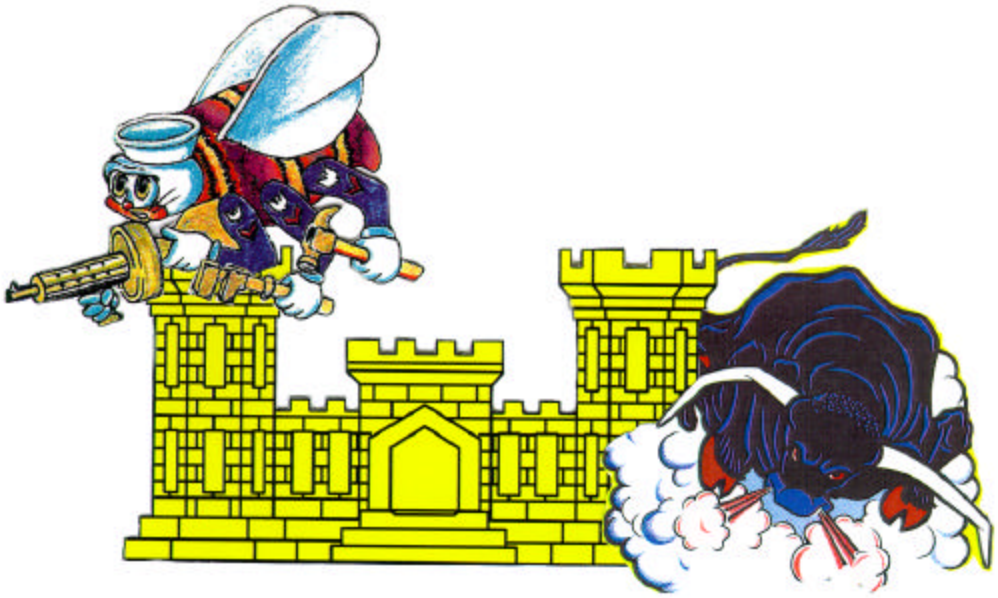
Review Questions
for
Mix Mortar

Question	Answer
1. The two types of cement are Portland and Masonry.	a. True b. False
2. How does masonry cement differ from Portland cement?	a. Stronger b. Last longer c. Cost effective d. Has lime already in the cement
When performing services in conditions where severe frost is prevalent, how much hydrated lime should be added when mixing one part portland cement?	a. 1 part b. 0 to 1 1/4 c. 3/4 d. All of the above
3. What is the minimum mixing time when mixing mortar?	a. 2 minutes b. 3 minutes c. 1 minute d. 5 minutes

MIX MORTAR

Performance Checklist		
Step	**Yes**	**No**
1. Was the trainee able to identify the difference between portland and masonry cement?		
2. Did the trainee use the proper amount of lime in the portland cement?		
3. Were all the dry materials mixed together before the water was added?		
4. Did the trainee use the correct type of sand when mixing the mortar?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



LAY MASONRY UNITS

MODULE 18 **AFQTP UNIT 2**

BLOCK (18.2.2.)

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BLOCK

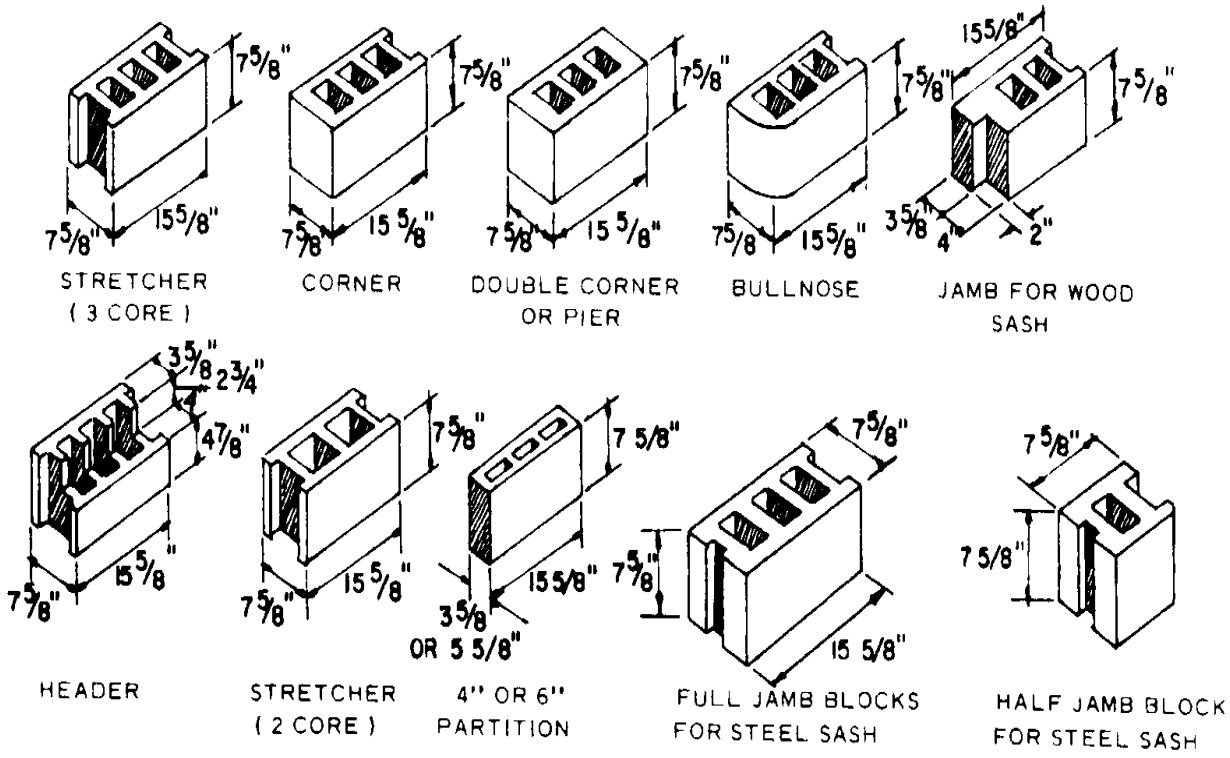
Task Training Guide

STS Reference Number/Title:	18.2.2. Block
Training References:	• 3E351 CDCs • NAVEDTRA 12521 • MODERN MASONRY by Clois E. Kicklighter • MASONRY BLOCK EXPLAINED by Bergwall Productions Video Tapes #3 Corner Construction & #4 Wall Construction
Prerequisites:	• Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	• Trowel, Jointer, Hammer, Chisel, Square, Mason level, Straight edge, and Chalk-line
Learning Objective:	• Individual should be able to lay and cut block for a required job
Samples of Behavior:	• Trainee will know the different types of block and which one to use for the required job
Notes:	

BLOCK

Background: One of the most common masonry units is the concrete block**.** It consists of hardened cement and may be completely solid or contain single or multiple hollows. Although concrete blocks come in many shapes and sizes, the most common size is 7-5/8 X 7-5/8 X 15-5/8. Many tradesmen call this an 8 x 8 x 16 block. All joints should be 3/8 inches in all applications. You must first establish the corner leads then fill in with the stretcher blocks.

Sizes and shapes of Blocks:



***When laying concrete block, follow these steps*:**

Step 1: Establish the corner lead.

Attach a line to the batter boards so that it follows the building line. Drop a plumb bob where the lines intersect to find the exact location of your first corner.

Step 2: Lay out the block.

Lay out the block first without any mortar. To keep your layout accurate, strike a chalkline to help you align your block. Now prepare a full bed of mortar for the first course of block.

Step 3: Lay the corner block first.

Lay the corner block first and position it carefully. Lay all the blocks with the wider edge of the face shell up to give a larger mortar bed for the next course.

Step 4: Prepare the mortar bed.

After you lay the corner block, prepare the mortar bed and butter the ends of the next block. Hold the block over its final position and push it downward into the mortar bed from the previous course and against the previously laid block on the same course.

After you have lain the first three or four blocks use your level as a straightedge to align them. Check the grade with your level, and plumb the blocks by tapping them with the handle of your trowel. Be careful not to chip the edge of the block. Build concrete block corners or leads three to five courses high before you fill in between the corners.

Laying Stretcher Blocks. To fill in the wall between the corners stretch a line from corner to corner and lay each block with the outside edge parallel to the line. Lay your mortar bed and butter each block like you did on the corner leads.

Laying Closure Blocks. The closure block is the last block laid in a course. Butter all four sides, then lower it into position, making sure that none of the mortar falls off. If your closure block is to big, you might have to cut it. You can cut a block by using a hammer and a chisel. Score the block by using light blows from the chisel and heavier blows until the block breaks.

Tooling the Joints. You need to tool the joints to make them water proof, uniform, and more attractive. Start with the horizontal joints using a jointer, and then do the vertical joints.

Review Questions
for
Block

Question	Answer
1. The most commonly used masonry unit is the concrete block.	a. True b. False
2. Lay the block with the wider edge down.	a. True b. False
3. The closure block is the last block laid.	a. True b. False

BLOCK

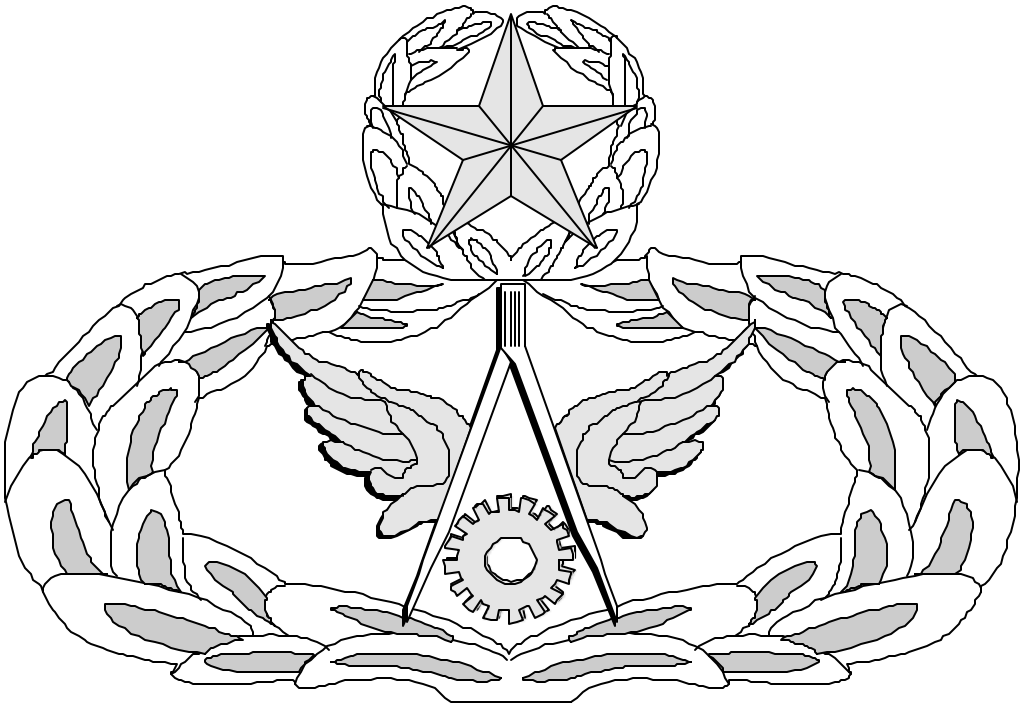
Performance Checklist		
Step	**Yes**	**No**
1. Did the trainee establish a good corner lead?		
2. Did the trainee make sure that the first course was straight and level?		
3. Did the trainee have joints that measured 3/8 inches?		
4. Did the trainee use string lines when laying the stretcher blocks?		
5. Did the trainee tool the joints before they were dry?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



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MODULE 18

MASONRY CONSTRUCTION AND MAINTENANCE

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MIX MORTAR

(3E3X1-18.1.2.)

Question	Answer
1. The two types of cement are Portland and Masonry.	a. True
2. How does Masonry cement differ from Portland cement?	d. Lime has been added in the cement
3. When performing services in conditions where severe frost is prevalent, how much hydrated lime should be added when mixing one part portland cement?	b. 0 to 1 1/4
4. What is the minimum mixing time when mixing mortar?	b. 3 minutes

BLOCK

(3E3X1-18.2.2.)

Question	Answer
1. The most commonly used masonry unit is the concrete block.	a. True
2. Lay the block with the wider edge down.	b. False
3. The closure block is the last block laid.	a. True